

BRIEF DESCRIPTION OF THE DRAWINGS

The features that are considered characteristic of this invention are set forth in the appended claims. This invention, however, both as to its origination and method of operations as well as additional advantages will best be understood from the following description when read in conjunction with the accompanying drawings in which:

FIG. 1 is a flow sheet denoting the invention as set forth in the appended claims.

FIG. 2 is a flow sheet denoting a method to produce a porous lignocellulose from a biomass.

FIG. 3 is a flow sheet denoting a method to produce glucose and ethanol from water soluble carbohydrates.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

In the preferred embodiment of the present invention, as claimed within claim 1, a means of producing water soluble carbohydrates derived from lignocellulose is presented. The water soluble carbohydrates are derived by hydrolysis of cellulose contained in a lignocellulose by enzymes.

The flow diagram of **Fig. 1** illustrates the general preferred embodiment of the present invention. In the diagram, rectangles represent stages, operations or functions of the present invention and not necessarily separate components. Arrows indicate direction of flow of material within the method.

Referring to **Fig. 1**, lignocellulose **10** is conveyed to hydrolysis stage **12** and combined with enzymes **14** and subjected to hydrolysis. Hydrolysis residue **22**, containing water and constituents from hydrolysis stage **12** is conveyed to filter stage **24** and filtered to produce filtrate **28** and filtered residue **26** conveyed to extract stage **30**. Filtered residue **26** is extracted by water **34** to produce extractate **36** and extracted residue **32**. Extractate **36**, containing water, is conveyed to hydrolysis stage **12**, to provide water and extracted constituents for hydrolysis. Filtrate **28** is conveyed to membrane filtration stage **16** which is employed to separate dissimilar molecular weights to produce a solution of water soluble carbohydrates substantially devoid of enzymes **20** and produce enzymes **14** to be conveyed to hydrolysis stage for recycle **12**. Membrane filtration stage **16** is generally an ultrafiltration membrane employed to separate dissimilar molecular weights. Hydrolysis of cellulose contained in lignocellulose is achieved by cellulase type enzymes to yield water soluble carbohydrates. Temperature and pH are adjusted within the hydrolysis environment to accomplish maximum hydrolysis rate allowed.

Porous lignocellulose, containing cellulose, renders cellulose readily accessible to cellulase enzymes.